Amendment to the Claims

In the Claims:

Please cancel Claims 19, 22, and 32.

Please amend Claims 3-7, 9-12, 13, 16, 18, 23, 24, 27-30, 33, and 36-40; and, add new Claims 41-52, as follows:

1. (Original) A device comprising:

a sensor based on a regenerative surface air sampler; and

a communication interface coupled to the sensor.

2. (Original) The device according to claim 1 wherein the sensor is selected from the group consisting of biological, chemical, and radiological sensors.

3. (Currently Amended) The device according to claim 1 wherein the communication interface is selected from the group consisting of a transmitter, a transceiver, and ann interface that is configured to communicate over an automation system network.

4. (Currently Amended) The device according to claim 1 wherein the ~~communication interface is a transceiver~~ sensor comprises:

a regenerable collection surface configured to collect particles from the air; and

a surface regenerator configured to remove particles from the regenerable collection surface, such that once regenerated, the regenerable collection surface can collect additional particles from the air, and such that particles collected before regeneration of the regenerable collection surface are substantially no longer present to contaminate particles collected after the regeneration.

5. (Currently Amended) The device according to ~~claim above, wherein the communication interface is configured to communicate over an automation system network~~ claim 4 wherein the regenerable collection surface is part of an impaction plate.

6. (Currently Amended) The device according to ~~claim 5 wherein the automation system network comprises a LonWorks® automation system~~ claim 4 wherein the sensor further comprises a spotting nozzle configured to direct an air stream towards the regenerable collection surface, such that the resulting impact of the air stream with the regenerable collection surface generates a spot of particles on the regenerable collection surface.

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7. (Currently Amended) The device according to ~~claim 5 wherein the automation system network comprises a CEBus automation system~~ claim 4 wherein the surface regenerator comprises at least one element selected from the group consisting essentially of:

a brush that regenerates the regenerable collection surface by brushing away particles that were collected on the regenerable collection surface;

a pad that regenerates the regenerable surface by pressing against the regenerable collection surface while there is movement between the pad and the regenerable collection surface relative to each other, so as to remove particles that were collected on the regenerable collection surface; and

a wheel coupled to a motor that regenerates the regenerable collection surface by pressing against the regenerable collection surface while the motor rotates the wheel, so as to remove particles that were collected on the regenerable collection surface.

8. (Original) The device according to claim 1 further comprising a battery backup power supply.

9. (Currently Amended) ~~A building and its envelope comprising the~~ The device according to claim 1, further comprising a building, such that the device is incorporated into the building.

10. (Currently Amended) ~~An airplane comprising the~~ The device according to claim 1 further comprising an aircraft, such that the device is incorporated into the aircraft.

11. (Currently Amended) ~~A system comprising: a~~ The device according to claim 1, wherein the sensor is capable to output a positive response to the communication interface; and further comprising an air sampler coupled to the communication interface, wherein the air sampler can be activated by the positive response capture at least one sample of airborne particles.

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12. (Currently Amended) ~~A system comprising:~~

~~a device according to claim 1, wherein the sensor is capable to output a positive response; and~~

~~at least one specific sensor selected from the group consisting of a chemical, a biological, and a radiological sensor, wherein the specific sensor is activated by the positive response~~ The device of claim 4 wherein the surface regenerator comprises at least one element selected from the group consisting essentially of:

a nozzle configured to direct high velocity air towards the regenerable collection surface to dislodge particles deposited thereon;

a blade configured to scrape the regenerable collection surface to dislodge particles deposited thereon;

means for electrostatically charging the collection surface, so that a static charge disperses the particles that were deposited thereon;

means for directing energy to the particles collected upon the regenerable collection surface to dislodge particles deposited thereon; and

means for directing energy to the regenerable collection surface to dislodge particles deposited thereon.

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13. (Currently Amended) [[A]] An air monitoring system comprising:

~~a device according to claim 1, wherein the sensor is capable to output a positive response; and~~

~~a second sensor, wherein the second sensor is other than a sensor based on a regenerative surface, and wherein the second is activated by the positive response~~

a sensor that includes:

a regenerable collection surface configured to collect particles from the air, to provide sample particles;

a surface regenerator configured to remove particles from the collection surface, such that once regenerated, the regenerable collection surface can collect additional particles from the air, particles that were collected before regeneration of the regenerable collection surface being substantially removed by the surface regenerator to avoid contaminating particles collected after the regeneration; and

an analyzer configured to determine characteristics of the particles collected on the regenerable collection surface;

a communication interface configured to enable the air monitoring system to be coupled to a network; and

a controller coupled to the sensor, the controller being configured to cyclically implement a plurality of functions, including:

directing airborne particles so that they are deposited on the regenerable collection surface to form a spot;

analyzing the particles forming the spot;

transmitting a signal over the communication interface when the analysis indicates the particles represent a potential threat; and

activating the surface regenerator to regenerate the regenerable collection surface after the particles have been analyzed.

14. (Original) An air monitoring system comprising:

a sensor based on a regenerative surface air sampler; and

a controller communicatively coupled to the sensor.

15. (Original) The system according to claim 14 wherein the sensor is selected from the group consisting of dumb sensors, smart sensors, and intelligent sensors.

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16. (Currently Amended) The system according to claim 14 wherein ~~the controller is a Neuron® chip~~ the sensor comprises:

a regenerable collection surface configured to collect particles from the air; and

a surface regenerator configured to remove particles from the regenerable collection surface, such that once regenerated, the regenerable collection surface can collect additional particles from the air, and such that particles collected before regeneration of the regenerable collection surface are substantially no longer present on the regenerable collection surface to contaminate particles collected after the regenerable collection surface is regenerated.

17. (Original) The system according to claim 14 wherein the controller is capable of actuating at least one other component in response to information received from the sensor.

18. (Currently Amended) ~~An HVAC system comprising a~~ The system according to claim 14 wherein the system is associated with air management equipment.

19. (Canceled)

20. (Original) A network comprising:

a sensor based on a regenerative surface air sampler;

a transceiver for communicating over an automation system network;

at least one actuator;

an air management component coupled to the actuator; and

a controller communicatively coupled to the sensor, the transceiver, and the actuator.

21. (Original) The network according to claim 20 wherein the controller actuates the air management component based on information received from the sensor.

22. (Canceled)

23. (Currently Amended) The network according to claim 20 wherein the ~~controller is a Neuron® chip~~ sensor comprises:

a regenerable collection surface configured to collect particles from the air; and

a surface regenerator configured to remove particles from the regenerable collection surface, such that once thus regenerated, the regenerable collection surface can collect additional particles from the air, and such that particles collected before regeneration of the regenerable collection surface are substantially no longer present on the regenerable collection surface to contaminate particles collected after the regeneration.

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24. (Currently Amended) The network according to ~~claim 20 wherein the transceiver communicates using a BACnet protocol~~ claim 23 wherein the surface regenerator comprises at least one element selected from the group consisting essentially of:

a brush that regenerates the regenerable collection surface by brushing away particles that were collected on the regenerable collection surface;

a pad that regenerates the regenerable surface by pressing against the regenerable collection surface while there is relative movement between the pad and the regenerable collection surface, so as to remove particles that were collected on the regenerable collection surface; and

a wheel coupled to a motor that regenerates the regenerable collection surface by pressing against the regenerable collection surface while the motor rotates the wheel, so as to remove particles that were collected on the regenerable collection surface.

25. (Original) The network according to claim 20 wherein the air management component is selected from the group consisting of a sample capture device, a sample analysis device, an air duct damper, and a particle counter.

26. (Original) A system comprising:

a sensor based on a regenerative surface air sampler;

a transceiver for communicating over an automation system network; and

a controller communicatively coupled to the sensor and the transceiver.

27. (Currently Amended) The system according to claim 26 wherein the controller communicates via ~~the transceiver using~~ at least one technique selected from the group consisting of a BACnet protocol, a wireless communication, an RF link to an RF link network, and a wired link.

28. (Currently Amended) The system according to claim 26 wherein the ~~controller communicates via the transceiver using LonTalk®~~ sensor comprises:

a regenerable collection surface configured to collect particles from the air; and

a surface regenerator configured to remove particles from the regenerable collection surface, such that once regenerated, the regenerable collection surface can collect additional particles from the air, and such that particles collected before regeneration of the regenerable collection surface are substantially no longer present on the regenerable collection surface to contaminate particles collected after regeneration of the regenerable collection surface.

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29. (Currently Amended) The system according to ~~claim 26 wherein the transceiver communicates wirelessly~~ claim 28 wherein the surface regenerator comprises at least one element selected from the group consisting essentially of:

a brush that regenerates the regenerable collection surface by brushing away particles that were collected on the regenerable collection surface;

a pad that regenerates the regenerable collection surface by pressing against the regenerable collection surface while the pad and the regenerable collection surface move relative to each other, so as to remove particles that were collected on the regenerable collection surface; and

a wheel coupled to a motor for regenerating the regenerable collection surface by pressing against the regenerable collection surface while the motor rotates the wheel, so as to remove particles that were collected on the regenerable collection surface.

30. (Currently Amended) The system according to ~~claim 29 wherein the transceiver communicates via an RF link to an RF link network~~ claim 28 wherein the sensor further comprises a mechanically-based homing sensor that positions the regenerable collection surface relative to a specific component, the specific component comprising at least one component selected from the group consisting essentially of:

a spotting nozzle configured to deposit a spot of particles on the regenerable collection surface;

an analyzer;

the surface regenerator; and

a liquid coating applicator used to apply a liquid to the regenerable collection surface.

31. (Canceled)

32. (Original) A method of constructing a network of sensors, the method comprising adding a sensor based on a regenerative surface air sampler to the network.

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33. (Currently Amended) The method according to claim 32 wherein the sensor ~~is a sensor of biological particles~~ comprises:

a regenerable collection surface configured to collect particles from the air; and

a surface regenerator configured to remove particles from the regenerable collection surface, such that once the regenerable collection surface is regenerated, the regenerable collection surface can collect additional particles from the air, and such that particles collected before regeneration of the regenerable collection surface are substantially no longer present on the regenerable collection surface to contaminate particles collected after the regeneration of the regenerable collection surface.

34. (Original) The method according to claim 32 where the network comprises a smoke or fire sensor.

35. (Original) A method of controlling ambient air quality, the method comprising:

sampling ambient air with at least one sensor based on a regenerative surface air sampler; and

upon receiving an indication of a probable threat from the sensor, performing a responsive step.

36. (Currently Amended) The method according to ~~claim 32,~~ claim 35 wherein the responsive step comprises at least one step selected from the group consisting essentially of actuating an air management component, activating at least one sampler specific sensor, issuing an warning signal, and transmitting an alert signal to facility management .

37. (Currently Amended) The method according to ~~claim 32 wherein the responsive step comprises activating at least one sampler specific sensor~~ claim 35 wherein the step of sampling ambient air with at least one sensor based on a regenerative surface air sampler comprises the step of sampling ambient air using a regenerative surface air sampler comprising:

a regenerable collection surface configured to collect particles from the air; and

a surface regenerator configured to remove particles from the regenerable collection surface, such that once regenerated, the regenerable collection surface can collect additional particles from the air, and such that particles collected before regeneration of the regenerable collection surface are substantially no longer present to contaminate particles collected after the regeneration of the regenerable collection surface.

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38. (Currently Amended) The method according to ~~claim 32 wherein the responsive step comprises issuing an warning signal~~ claim 37 further comprising the step of analyzing particles on the regenerable collection surface to determine whether or not an indication of a probable threat exists.

39. (Currently Amended) The method according to ~~claim 35 further comprising transmitting the alert signal to facility management~~ claim 38 wherein after the step of analyzing the particles, further comprising the step of activating the surface regenerator to remove particles from the regenerable collection surface, such that once regenerated, the regenerable collection surface can collect additional particles from the air, and such that particles collected before regeneration of the regenerable surface are substantially no longer present to contaminate particles collected after the regeneration.

40. (Currently Amended) The method according to claim 35 ~~further comprising~~ wherein the responsive step comprises the step of transmitting [[the]] an alert signal to a fire department or law enforcement agency. ~~34. The method according to claim 32 where the network comprises a smoke or fire sensor.~~

41. (New) The device of claim 4 wherein the sensor further comprises at least one element selected from the group consisting of:

a particle concentrator configured to increase a concentration of airborne particles within a desirable size range in an air stream from which the regenerable collection surface collects particles; and

a size-selective inlet configured to precondition air from which particles are to be collected by the regenerable collection surface by removing particles from the air that have a size greater than a predefined size.

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42. (New) The device of claim 4 wherein the sensor further comprises a mechanically-based homing sensor that positions the regenerable collection surface relative to a selected component, the selected component comprising at least one component selected from the group consisting essentially of:

a spotting nozzle configured to deposit a spot of particles on the regenerable collection surface;

an analyzer;

the surface regenerator; and

a liquid coating applicator used to apply a liquid to the regenerable collection surface, to moisten the regenerable collection surface prior to collecting the particles, thereby enhancing a collection efficiency of the regenerable collection surface.

43. (New) The device of claim 4 wherein the sensor further comprises:

an analyzer configured to examine characteristics of the particles collected on the regenerable collection surface; and

a processor coupled to the analyzer, the processor being logically configured to determine a concentration of biological particles collected on the regenerable collection surface, and to activate an alarm signal when the processor determines that the concentration of biological particles collected on the regenerable collection surface exceeds a predetermined value.

44. (New) Apparatus configured to collect airborne particles, comprising:

a sensor based on a regenerative surface air sampler, the sensor comprising:

a regenerable collection surface configured to collect particles from the air; and

a surface regenerator configured to remove particles from the regenerable collection surface, such that once regenerated, the regenerable collection surface can collect additional particles from the air, and such that particles collected before regeneration of the regenerable collection surface are substantially no longer present to contaminate particles collected after the regeneration; and

a communication interface coupled to the sensor.

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45. (New) A method for continuously monitoring airborne particles, the method repetitively carrying out a plurality of cycles, each cycle comprising the steps of:

depositing particles that were airborne on a regenerable collection surface;

analyzing the particles that were deposited on the regenerable collection surface;

when analysis indicates that the particles deposited represent a potential threat, transmitting a signal indicative of the potential threat over a network; and

regenerating the regenerable collection surface to substantially remove the particles that were deposited thereon during a previous cycle.

46. (New) The method of claim 45 wherein the step of depositing particles on the regenerable collection surface comprises the step of depositing the particles to form a spot.

47. (New) The method of claim 45 wherein the step of regenerating the collection surface comprises at least one step selected from the group of steps consisting essentially of:

brushing the regenerable collection surface, to dislodge the particles deposited on the regenerable collection surface;

pressing a pad against the regenerable collection surface while there is relative motion between the pad and the regenerable collection surface, to remove the particles deposited on the regenerable collection surface;

pressing a wheel against the regenerable collection surface while there is relative motion between the wheel and the regenerable collection surface, to remove the particles deposited on the regenerable collection surface;

directing high velocity air towards the regenerable collection surface to dislodge the particles deposited on the regenerable collection surface;

electrostatically charging the regenerable collection surface to electrostatically disperse the particles deposited on the regenerable collection surface; and

directing energy to the particles collected upon the regenerable collection surface to dislodge the particles deposited on the regenerable collection surface.

48. (New) The method of claim 45 further comprising the step of verifying that the step of regenerating the regenerable collection surface has substantially removed the particles that were previously deposited before starting to deposit particles on the regenerable collection surface in a next cycle.

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49. (New) The method of claim 48 wherein the step of analyzing the particles that were deposited comprises measuring fluorescence properties of the deposited particles, and the step of verifying that the step of regenerating the regenerable collection surface has substantially removed the particles that were previously deposited comprises the steps of:

determining a background fluorescence level for the regenerated collection surface; and

comparing the background fluorescence level with predetermined criteria, such that if the background fluorescence level does not substantially satisfy the predetermined criteria, the step of regenerating is repeated before starting to deposit particles on the regenerable collection surface in a next cycle, until the background fluorescence level substantially satisfies the predetermined criteria.

50. (New) The method of claim 45 wherein the step of analyzing the particles that were deposited comprises at least one step selected from the group consisting of:

pre-treating the particles that were deposited by performing plasma lysing, adding a matrix solution, and measuring a mass spectra of the particles that were deposited and pretreated, using mass spectrometry; and

measuring an autofluorescence of any bio-molecules that may be present in the particles that were deposited to obtain a biological signature of the particles, the biological signature being obtained using the steps of:

determining an average value and a standard deviation based on previously obtained estimates of the concentration of biological particles;

comparing the estimated concentration to the average value; and

transmitting the signal if the estimated concentration exceeds a sum of the average value and a product of a predetermined factor and the standard deviation.

51. (New) The method of claim 45 wherein the method steps are implemented by a plurality of sensors coupled together to form a network, to enable air monitoring over a wider area than that monitored using a single sensor.

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52. (New) The method of claim 45 wherein the step of transmitting the signal indicative of the results over the network comprises at least one step selected from the group of steps consisting essentially of:

activating an alarm signal directed to a designated party;

actuating an air management component;

producing a warning signal;

moving a damper in an air duct;

transmitting an alarm signal to a fire department;

transmitting an alarm signal to a law enforcement agency; and

transmitting an alarm signal to a management entity responsible for managing a facility.

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